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# Utilization of a Community Pharmacy-Based Service for the Treatment of Uncomplicated Urinary Tract Infections in Scotland

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# Utilization of a Community Pharmacy-Based Service for the Treatment of Uncomplicated Urinary Tract Infections in Scotland

CAPSTONE PROJECT PAPER

A paper submitted in partial fulfillment of the
requirements for the degree of
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**ABSTRACT**

Introduction: In November 2013, Scotland piloted a program in Grampian for the treatment of Urinary Tract Infections (UTIs) in community pharmacies, increasing health access for patients and reducing general practitioner workload. This program became known as 'Pharmacy First' and was later implemented nationwide in November 2017. This paper seeks to understand utilization of the Pharmacy First program across Scotland by patients and potential barriers to access.

Methods: Using data from the Prescribing Information System collected by the National Health Service of Scotland from July 2013 to April 2019, orders for uncomplicated UTIs were gathered by examining all nitrofurantoin and trimethoprim prescriptions dosed according to the National Institute for Health and Care Excellence (NICE) guidelines (allowing up to a maximum 7 day supply), including women 16-65 years of age (those who would qualify for Pharmacy First). Prescribing rates for UTIs by community pharmacists were compared to all prescribers, and rates were broken down by age, location by regional health board, and socioeconomic quintile based on 2019 data from quarter one.

Results: In Q1 2019, 12,628 UTI prescriptions were prescribed by community pharmacists in Scotland for women 16-65 years of age, comprising 19% of all UTI prescriptions in that group. In two of the first three health boards to have implemented the service, the numbers were even higher at 29%. Community pharmacists prescribed 23% of UTI prescriptions for women in the highest socioeconomic quintile and 16% of UTI prescriptions for women in the lowest socioeconomic quintile. Women 51-65 years of age received 31% fewer prescriptions from community pharmacists than women 16-50 years of age.

Discussion: Data suggests Pharmacy First has seen significant growth, particularly since its implementation nationwide in 2017. As earlier implementers have higher rates of Pharmacy First use, there is still room for growth nationally. Differences between socioeconomic status and age groups suggest that there may be barriers to access or issues in patient acceptability and preference.

Conclusion: These findings could be used to reinforce that the role of the community pharmacist can be enhanced in the diagnosis and treatment of uncomplicated UTIs with the potential for protocol extensions to other common conditions. There may be some differences in patient access and acceptability of such services, and this warrants further study.

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**LIST OF ABBREVIATIONS**

PGD: Patient Group Direction

PIS: Prescribing Information System

NICE: National Institute for Health and Care Excellence

SIMD: Scottish Index of Multiple Deprivation

UTI: Urinary Tract Infection

## INTRODUCTION

Following a study in 2010 for the treatment of uncomplicated urinary tract infections (UTIs) conducted across 20 pharmacies in Scotland,[1] Grampian (one of 14 health boards in Scotland) approved the first regional program in the nation for the treatment of urinary tract infections within community pharmacies in 2013.[2] By 2017, all health boards within Scotland had approved the program, which became known as Pharmacy First and has since expanded to include other services such as treatment for impetigo. This service was intended to reduce workload for general practitioners and to increase access to care for patients, who can be seen immediately by a pharmacist that can prescribe an appropriate treatment.[3]

In order to better understand the legal framework surrounding Pharmacy First, it's important to know that non-physician health professionals in Scotland can supply medications through policies called Patient Group Directions (PGDs), which must be approved by both a physician and a pharmacist practicing in Scotland. PGDs are required to define the condition that is intended to be treated, the type of health professional allowed to prescribe under the PGD, inclusion and exclusion criteria for patients to be treated under the PGD, the medications allowed to be supplied, key counseling points, and follow-up actions, if needed.[4] Each of Scotland's 14 health boards have approved a separate PGD, which are similar in terms of inclusion and exclusion criteria. However, two health boards (Greater Glasgow and Clyde and Tayside) differ in that they allow trimethoprim or nitrofurantoin as antibiotic treatment options rather than just trimethoprim.[5,6]

To meet the inclusion criteria to be treated through Pharmacy First, potential patients must be females 16 to 65 years of age presenting with either both dysuria and polyuria or three or more of any of the following symptoms: dysuria, polyuria, urgency, hematuria, or suprapubic

tenderness. Exclusion criteria includes male sex, age less than 16 or over 65, pregnancy, vaginal itching or discharge, symptoms suggestive of upper urinary tract infection (fever, nausea, vomiting, diarrhea, chills, loin pain or tenderness, or systemically unwell), a prior UTI in the past 28 days, 2 or more UTIs in the last 6 months, 3 or more UTIs in the last 12 months, use of a catheter, moderate to severe renal impairment, sensitivity to the antibiotics allowed under the PGD, or use of medications with significant interaction with antibiotics allowed under the PGD.[5,6]

The aforementioned criteria are designed to prevent patients who might require a higher level of care or a more thorough diagnostic work-up from being inappropriately treated under the PGD. For example, patients with a complicated UTI (by definition all males) or a recurrent UTI may require urine cultures to help guide antibiotic selection, which cannot be performed within pharmacies, and patients with vaginal pruritus or discharge may not have a UTI. Of note, there is some variability between health boards in terms of exclusion criteria, and since the PGD must be renewed every three years, there have been some changes made in the originally implemented PGDs, such as the Grampian health board's decision to remove diabetes as an exclusion criteria in 2018.[6]

After a patient has been screened, the pharmacist can then decide if referral to a general practitioner is required or if treatment with trimethoprim 200 mg three times daily for three days (or an equivalent three day course of nitrofurantoin if the health board PGD allows it) is appropriate. A urine dipstick test can be considered as part of the screening criteria but is not required and not routinely recommended because it adds little diagnostic value and results in an unnecessary increase in healthcare costs.[6]

One study was published in 2010 regarding the use of community pharmacies as centers for the treatment of urinary tract infections.[1] Little data have been published regarding the use of

Pharmacy First since it was approved regionally in the Grampian health board in 2013,[2] and even less has been published regarding its use nationwide since approval in 2017.[3] To the best of my knowledge, this study is the first study evaluating how successful Pharmacy First has been, if Pharmacy First is continuing to expand, whether certain patient populations are benefiting more or less from the services, and how this program can affect the future of public health and community pharmacy practice in Scotland. I will use data from the national Prescribing Information System (PIS) to track the number of prescriptions for uncomplicated UTIs in Scotland prescribed by pharmacists via Pharmacy First versus other providers in 2013 – 2019. I hypothesize that the reliance on the Pharmacy First initiative as a means of managing uncomplicated UTIs has increased over time.

## LITERATURE REVIEW

Although the concept of being assessed and prescribed a medication by a community pharmacist may sound like a novel concept, a routine responsibility of community pharmacists includes conducting assessments of patients when they present to the pharmacy with a complaint and, if the condition can be treated with an over the counter medication without a referral, recommending an appropriate therapy. Scotland established a program in 2006 called the Minor Ailment Scheme so that pharmacists could assess patients and prescribe over the counter medications. This enabled qualified patients to receive their medications at no cost, and pharmacists to receive reimbursement for their services.[7] Through exposure to these programs, many patients in Scotland already have experience with being assessed and prescribed a medication by a pharmacist well before Pharmacy First was implemented in Grampian in 2013.[2]

In the United States, similar changes have been expanding the services provided by community pharmacies. In 2004, New Mexico authorized the first statewide protocol in the United States granting community pharmacists prescriptive authority and allowing pharmacists within the state to prescribe medications for smoking cessation.[8] By 2009, all states have authorized protocols permitting community pharmacies to offer and administer vaccines.[9] As of 2019, nine states have implemented protocols allowing pharmacists to prescribe birth control,[8] and some states have even approved protocols allowing community pharmacists to provide a wider array of services including testing and treatment for urinary tract infections, influenza, streptococcal pharyngitis, and substance use disorder.[10]

The goal of these expanded community pharmacy services both in the United States and in Scotland is to provide greater access to medical care for patients and to reduce burden on primary care. In the United States, an estimated shortage of 14,500 primary care physicians was reported

in 2017, and that number is expected to grow to somewhere between 21,000 and 55,200 by 2030.[11] In Scotland, there has been a similar shortage of primary care services, which the government has begun to address with plans to not only hire more physicians but also to expand the role of allied health providers including physical therapists and pharmacists.[12]

In general, pharmacists are considered one of the most easily accessible healthcare providers. The vast majority of pharmacies offer hours beyond typical business hours, and most are also open on weekends. Additionally, 91% of Americans live within five miles of a pharmacy, making pharmacists much more accessible from a geographical access-to-care perspective as well.[13] Finally, pharmacists already have training and experience in diagnosing and treating minor ailments, so it is logical that community pharmacists might play a role in public health and increased access to medical care.[13]

Although less is known about Pharmacy First, other widespread community pharmacy-based services have been reported to increase access to care and reduce costs. In the United States, one study found that nearly one third of patients utilizing community pharmacies for immunizations went outside typical business hours.[14] Therefore, enhanced community pharmacy-based services can play a vital role in increasing access to primary care. A systematic review of pharmacy-based immunization services found that pharmacy-based vaccinations significantly reduced costs compared to physician clinics, demonstrating that pharmacy-based services are not only more accessible but also more cost effective. However, the same report noted reduced access to pharmacy-based immunization services in medically underserved communities.[15] Therefore, an important step in evaluating Pharmacy First data will include evaluating the programs use among patients residing in more rural areas and also examining usage rates by socioeconomic status.

Overall, pharmacists in both Scotland and the United States are beginning to see an increased role in addressing public health concerns, particularly in providing infectious disease prevention, testing, and treatment services. Data from the United States indicate that pharmacists can also play an important role in increasing access to medical care in underserved areas as most pharmacies offer extended hours of service compared to medical clinics, are conveniently located, and can see patients without an appointment. As both countries consider further expansion of pharmacy services, it will be important to understand the services in terms of usage and disparities in access, which this research will address using Pharmacy First in Scotland as an example. Additional factors that will not be addressed in this paper but warrant further research include patient and provider acceptability and cost.

## METHODS

### *Study Purpose*

Data were collected every yearly quarter on the total number of prescriptions for UTIs written for first line antibiotics (i.e., trimethoprim and nitrofurantoin) in Scotland between the initiation of Pharmacy First and the first quarter of 2019 using data from the Prescribing Information System of Scotland. Before data extraction, inclusion and exclusion criteria used by Pharmacy First such as patient age were applied so that only UTI prescriptions dispensed to patients potentially eligible for Pharmacy First were measured. The number of UTI prescriptions prescribed overall as well as specifically through Pharmacy First was obtained to calculate the prevalence of Pharmacy First utilization each quarter. Additionally, data from the most recent quarter (quarter one of 2019) will be used to describe the utilization of Pharmacy First by age, health board, and socioeconomic status.

### *Study Population*

Data extracted from the Prescribing Information System included patient demographics (e.g., age, gender, and health board), prescribers, and medications (e.g., name, strength, and quantity). This database does not include a diagnosis associated with a particular prescription or a patient's medical history. However, the diagnosis of an uncomplicated UTI could be inferred as nitrofurantoin and trimethoprim (the only two first-line therapies for uncomplicated UTIs) are used almost exclusively for UTIs, and the quantity being dispensed corresponds to whether those antibiotics are being used as treatment for uncomplicated UTIs, treatment for complicated UTIs, or prophylaxis for patients with recurrent UTIs (which is further discussed below).

### *Study Design*

I conducted a descriptive analysis using data from quarter one of 2019 (last quarter of follow-up) and an interrupted time series analysis to assess the changes in the proportion of UTI prescriptions prescribed through Pharmacy First relative to the total number of UTI prescriptions between the quarter three of 2014 and quarter one of 2019. In order to differentiate prescriptions initiated from Pharmacy First for UTIs versus other sources, prescriptions classified under the form types "Urgent Supply of Medicines" and "Minor Ailment Scheme" within the Prescribing Information System were assumed to have been initiated through Pharmacy First as those form types are used exclusively by community pharmacists. Of note, the initial Pharmacy First pilot program started in quarter four of 2013. However, Pharmacy First prescriptions were not submitted using the standard community pharmacy prescription form types until quarter three of 2014, so data before that point will not be included in this study.

For the descriptive analysis, we used a bivariate analysis to compare prescribing patterns by age, health board, and socioeconomic status. The proportion of UTI prescriptions potentially eligible for Pharmacy First that were prescribed through the program compared to the number of potentially eligible prescriptions dispensed overall will be broken down by patient age in five-year age bands, health board where the prescriptions were dispensed, and patient socioeconomic status as reflected by their Scottish Index of Multiple Deprivation (SIMD) quintile. A SIMD quintile of one reflects the lowest socioeconomic status, and a SIMD quintile of five reflects the highest socioeconomic status.

### *Inclusion Criteria*

Prescriptions for trimethoprim 100 mg tablets and nitrofurantoin 50 mg and 100 mg capsules between the third quarter of 2014 and the first quarter of 2019 were included. These

antibiotics are the only first line therapies recommended for patients with uncomplicated UTIs per National Institute for Health and Care Excellence (NICE) guidelines, which are medical guidelines followed by prescribers practicing in Scotland and the rest of the United Kingdom.

***Exclusion Criteria***

Prescriptions dispensed for patients who were male or for patients aged less than 16 years or greater than 65 years were excluded. However, other exclusion criteria such as vaginal discharge and history of diabetes could not be assessed as the Prescribing Information System does not store patient medical histories or diagnoses.

Furthermore, trimethoprim and nitrofurantoin are both used primarily for treatment of urinary tract infections and are the only first line therapies for this diagnosis. However, the drugs can also be used for prevention of recurrent infections, and trimethoprim may also be used for complicated urinary tract infections (neither of which are indications for community pharmacists to dispense those antibiotics under Pharmacy First). In order to exclude prescriptions written for those purposes, prescriptions written for a quantity of antibiotics corresponding to a supply greater than seven days were excluded since complicated UTIs should be treated with trimethoprim for at least two weeks and prescriptions written for UTI prophylaxis are generally written for quantities of at least a one-month supply.[16] A quantity of antibiotic corresponding to a seven-day supply was 14 for trimethoprim 100 mg tablets (dosed twice daily), 28 for nitrofurantoin 50 mg capsules (dosed four times daily), and 14 for nitrofurantoin 100 mg capsules (dosed twice daily). Although National Institute for Health and Care Excellence (NICE) guidelines do not recommend trimethoprim and nitrofurantoin therapies be used for greater than three days in patients with uncomplicated UTIs, [17] prescribers sometimes choose a longer duration than what is recommended, and it is not uncommon for prescribers to treat an uncomplicated UTI up to seven

days, which is why a seven day supply was used as the maximum supply for a prescription to be considered a treatment dose for an uncomplicated UTI.

***Statistical Analysis***

The percentages of all prescriptions for uncomplicated UTIs that were dispensed through Pharmacy First each quarter were modeled using a segmented regression to detect whether there were any changes in trend and level before and after the national launch of the program in quarter four of 2017.[18] Because the level change was not statistically significant, the final model was used to test whether there has been any significant change in level in the percentage of prescriptions through Pharmacy First after the national launch. The model was estimated using Prais-Winston method to account for the first order autoregressive structure in the time series data.[19] Stata SE v16 was used for statistical analysis.

## RESULTS

### Pharmacy First Utilization by Calendar Year and Quarter

Between quarter three of 2014 and quarter one of 2019, the proportion of prescriptions dispensed through Pharmacy First increased from less than 0.1% to 18.7%. Using a time series analysis, the rate of growth in the proportion of prescriptions dispensed through Pharmacy First before quarter four of 2017 (when Pharmacy First was implemented nationwide) was 0.26% each quarter (95% confidence interval [CI], 0.11% - 0.40%). After quarter four of 2017, the rate of growth of in the proportion of prescriptions dispensed through Pharmacy First increased ten-fold to 2.66% per quarter (95% CI, 2.26% - 3.07%).

**Figure 1: Pharmacy First Utilization by Calendar Year and Quarter**

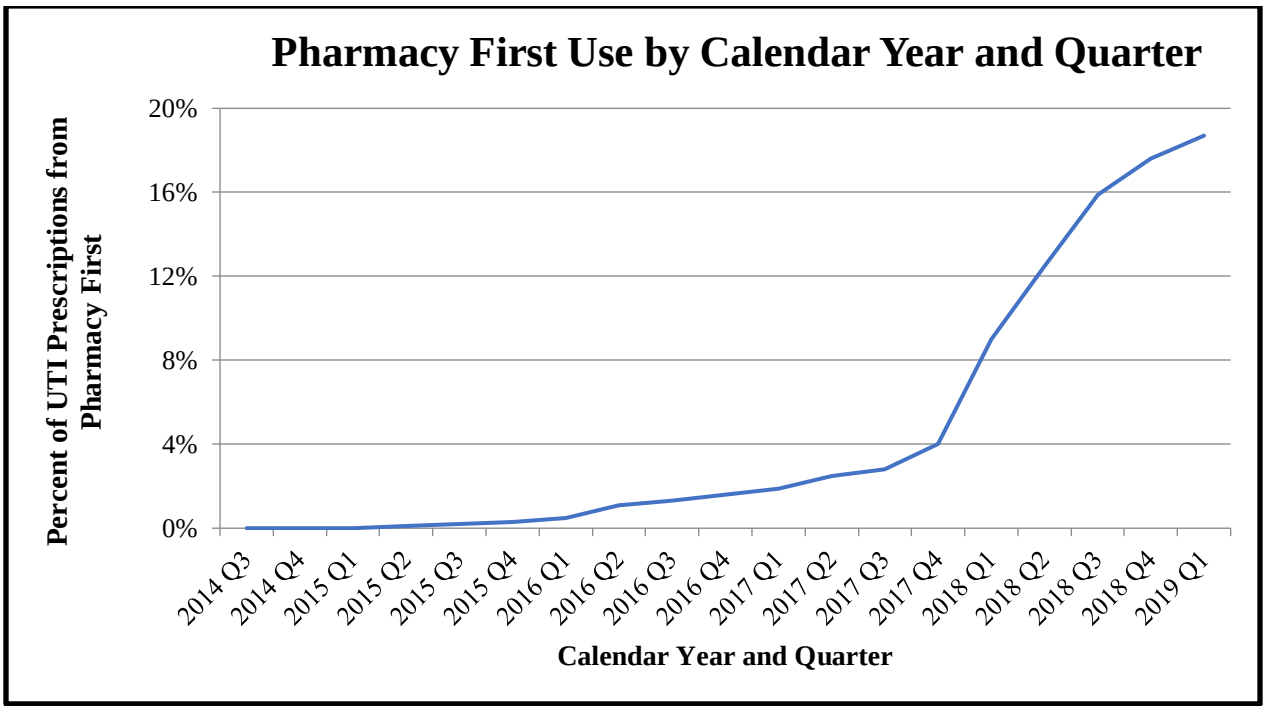

**Table 1: Pharmacy First Utilization by Calendar Year and Quarter**

| Calendar Year and Quarter | Number of UTI Antibiotic Prescriptions from Pharmacy First | Total Number of UTI Antibiotic Prescriptions | Percent of UTI Prescriptions Dispensed through Pharmacy First |
|---|---|---|---|
| 2014 Q3 | 7 | 68395 | 0.0% |
| 2014 Q4 | 11 | 69307 | 0.0% |
| 2015 Q1 | 19 | 63451 | 0.0% |
| 2015 Q2 | 46 | 61295 | 0.1% |
| 2015 Q3 | 117 | 67504 | 0.2% |
| 2015 Q4 | 186 | 69037 | 0.3% |
| 2016 Q1 | 332 | 64660 | 0.5% |
| 2016 Q2 | 658 | 62187 | 1.1% |
| 2016 Q3 | 855 | 68390 | 1.3% |
| 2016 Q4 | 1089 | 68006 | 1.6% |
| 2017 Q1 | 1246 | 65333 | 1.9% |
| 2017 Q2 | 1573 | 62150 | 2.5% |
| 2017 Q3 | 1883 | 68317 | 2.8% |
| 2017 Q4 | 2685 | 66826 | 4.0% |
| 2018 Q1 | 5733 | 63787 | 9.0% |
| 2018 Q2 | 7804 | 62213 | 12.5% |
| 2018 Q3 | 11323 | 71132 | 15.9% |
| 2018 Q4 | 12511 | 71186 | 17.6% |
| 2019 Q1 | 12628 | 67380 | 18.7% |

**Pharmacy First Utilization by Health Board in Quarter One of 2019**

As noted in Table 2 below, four health boards including Grampian, Forth Valley, Lanarkshire, and Ayrshire and Arran had 13% to 59% higher Pharmacy First utilization rates than the national average (all comparisons $p < 0.05$). Alternatively, seven health boards had significantly lower Pharmacy First utilization for UTIs than the national average. One health board (Western Isles) had no prescriptions dispensed through Pharmacy First during quarter one of 2019.

**Figure 2: Pharmacy First Utilization by Health Board in Quarter One of 2019**

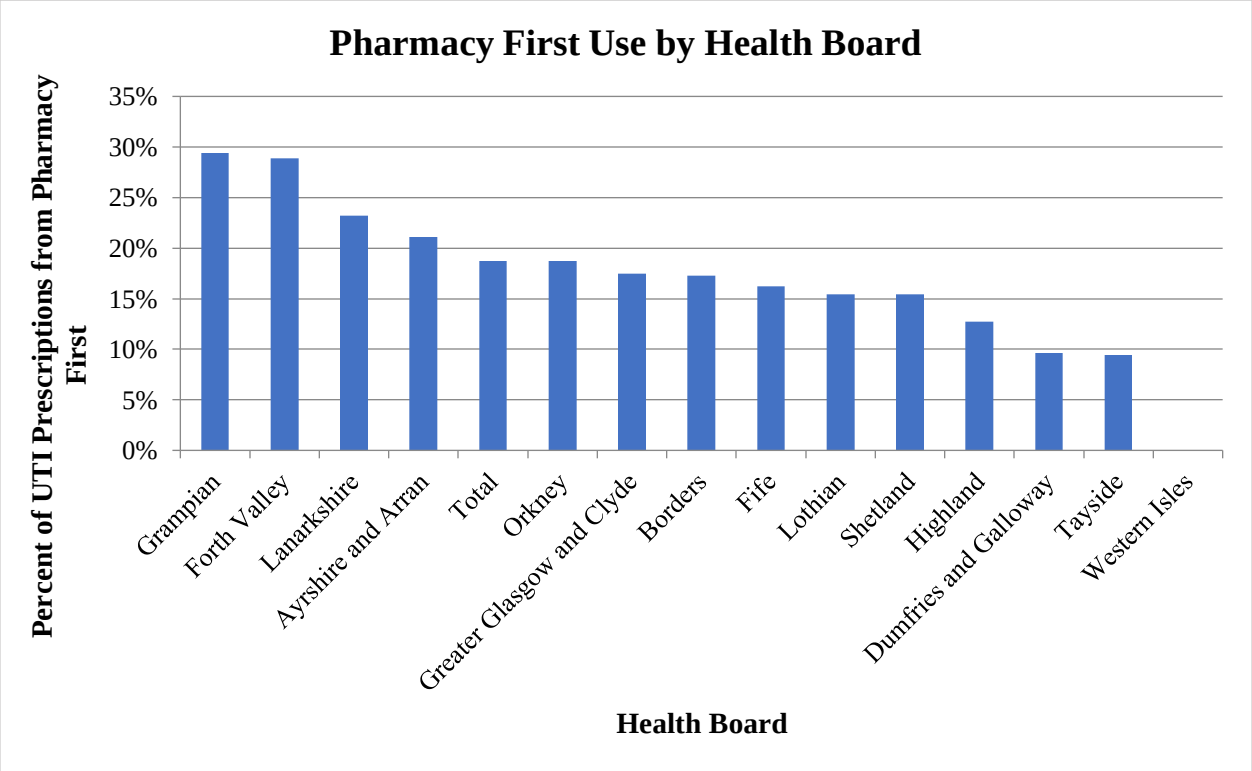

**Table 2: Pharmacy First Utilization by Health Board in Quarter One of 2019**

| Health Board | Percent of UTI Prescriptions Dispensed through Pharmacy First | Prevalence of Pharmacy First Use Relative to Nationwide Average | 95% Confidence Interval |
|---|---|---|---|
| Ayrshire and Arran | 21.1% | 1.13 | 1.06,1.19 |
| Borders | 17.3% | 0.92 | 0.81,1.05 |
| Dumfries and Galloway | 9.6% | 0.51 | 0.44,0.59 |
| Fife | 16.2% | 0.87 | 0.80,0.93 |
| Forth Valley | 28.9% | 1.54 | 1.46,1.63 |
| Grampian | 29.4% | 1.59 | 1.50,1.64 |
| Greater Glasgow and Clyde | 17.5% | 0.93 | 0.90,0.97 |
| Highland | 12.7% | 0.60 | 0.55,0.66 |
| Lanarkshire | 23.2% | 1.24 | 1.19,1.29 |
| Lothian | 15.4% | 0.82 | 0.78,0.86 |
| Orkney | 18.7% | 1.00 | 0.75,1.33 |
| Shetland | 15.4% | 0.71 | 0.53,0.96 |
| Tayside | 9.4% | 0.50 | 0.46,0.55 |
| Western Isles | 0% | - | - |
| Overall Average | 18.7% | - | - |

**Pharmacy First Utilization by Age in Quarter One of 2019**

Another difference in prevalence of Pharmacy First utilization can be seen among patients in different age groups. When comparing patients 16 to 50 years of age to patients 51 to 65 years of age, the latter group was 30% less likely to seek care through Pharmacy First (95% CI, 28% - 32%).

**Figure 3: Pharmacy First Utilization by Age in Quarter One of 2019**

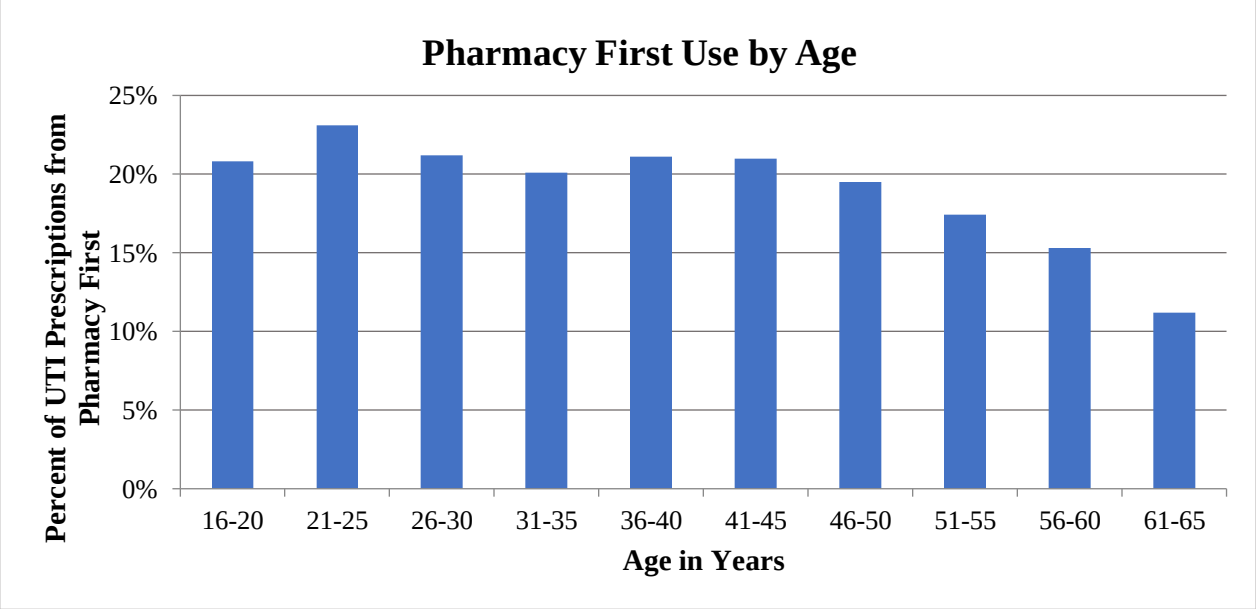


**Table 3: Pharmacy First Utilization by Age in Quarter One of 2019**

| Patient Age | Percent of UTI Prescriptions Dispensed through Pharmacy First | Prevalence of Pharmacy First Use Relative to Overall Average | 95% Confidence Interval |
|---|---|---|---|
| 16-20 | 20.8% | 1.11 | 1.05,1.17 |
| 21-25 | 23.1% | 1.23 | 1.18,1.29 |
| 26-30 | 21.2% | 1.13 | 1.08,1.19 |
| 31-35 | 20.1% | 1.08 | 1.02,1.13 |
| 36-40 | 21.1% | 1.12 | 1.07,1.18 |
| 41-45 | 21.0% | 1.12 | 1.06,1.19 |
| 46-50 | 19.5% | 1.04 | 0.99,1.09 |
| 51-55 | 17.4% | 0.93 | 0.88,0.97 |
| 56-60 | 15.3% | 0.81 | 0.77,0.86 |
| 61-65 | 11.2% | 0.60 | 0.56,0.64 |
| Overall Average | 18.7% | N/A | N/A |

**Pharmacy First Utilization by Socioeconomic Quintile in Quarter One of 2019**

Pharmacy First use appears to be linearly increasing in higher SIMD groups. Pharmacy First was more frequently used by people of higher socioeconomic statuses as indicated by higher use among SIMD quintile five patients and lowest use among SIMD quintile one patients. Compared to people in SIMD quintile five, people in SIMD quintile one were 31% less likely to use Pharmacy First (95% CI, 28% to 34%)

**Figure 4: Pharmacy First Utilization by Socioeconomic Quintile in Quarter One of 2019**

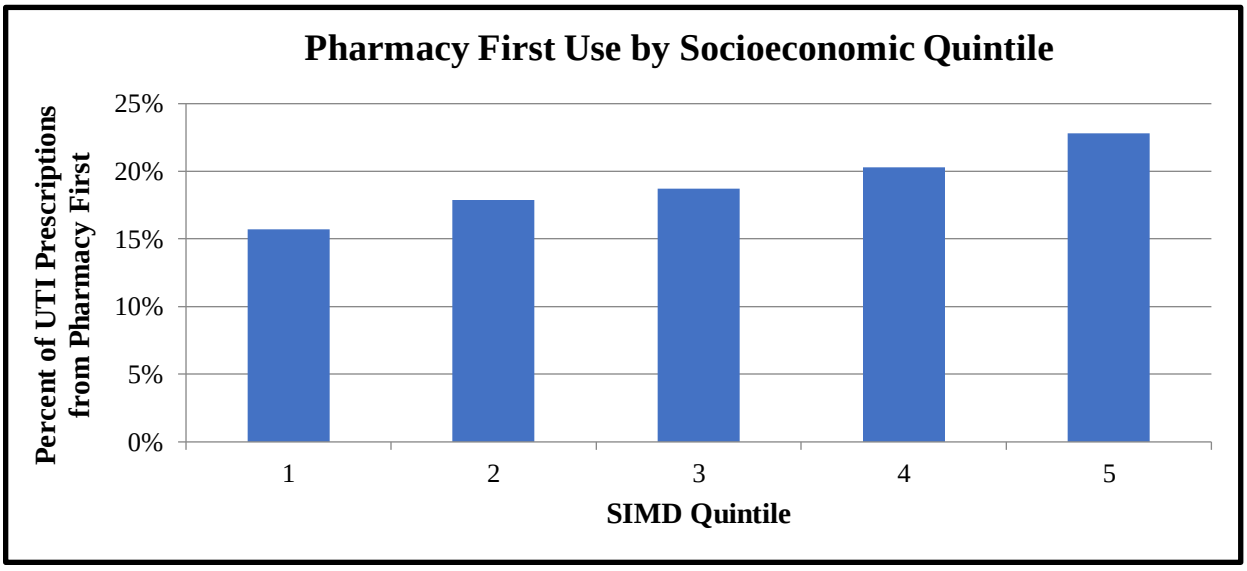


**Table 4: Pharmacy First Utilization by Socioeconomic Quintile in Quarter One of 2019**

| SIMD Quintile | Percent of UTI Prescriptions Dispensed through Pharmacy First | Prevalence of Pharmacy First Use Relative to Overall Average | 95% Confidence Interval |
|---|---|---|---|
| 1 | 15.7% | 0.79 | 0.76,0.83 |
| 2 | 17.9% | 0.94 | 0.91,0.98 |
| 3 | 18.7% | 1.00 | 0.96,1.04 |
| 4 | 20.3% | 1.11 | 1.06,1.15 |
| 5 | 22.8% | 1.27 | 1.22,1.32 |
| Overall Average | 18.7% | N/A | N/A |

**DISCUSSION**

Since the implementation of Pharmacy First as a pilot program in a single health board (Grampian) in 2013, the percentage of women utilizing pharmacies for UTI management has grown significantly, particularly since 2017 when Pharmacy First was implemented nationwide. As of the most recent 12 months of data, over 44,000 prescriptions for antibiotics were prescribed by community pharmacists for UTI treatment through Pharmacy First, accounting for nearly 19% of UTI prescriptions in Scotland in the first quarter of 2019. Additionally, these numbers are continuing to grow each quarter, and as more community pharmacists begin to offer UTI treatment services and as more women become familiar with the process of using Pharmacy First, these number can be expected to increase.

One difference in Pharmacy First utilization can be seen on the basis of age with women 51 to 65 years of age being 30% less likely to use Pharmacy First. A possible explanation is that younger women may already be familiar with the process of using similar pharmacy services such as the Minor Ailment Scheme, through which patients can receive some over the counter and prescription medications such as emergency contraception. Additionally, younger women may feel more comfortable discussing symptoms related to UTIs outside a general practitioner office. In the future, more women may be expected to utilize Pharmacy First as younger patients who are more familiar with pharmacy services continue to age and patients overall become more aware of how to use Pharmacy First for UTI treatment. Alternatively, older women may be more likely to meet exclusion criteria for UTI treatment for Pharmacy First such as taking medications with significant drug interactions to the antibiotics authorized for use under Pharmacy First.

Additionally, there also appeared to be a disparity among patients using Pharmacy First based on socioeconomic status (as measured by SIMD quintiles). Notably, people in the lowest

socioeconomic quintile were 31% less likely to use Pharmacy First for UTI treatment. One factor contributing to differences in utilization based on socioeconomic status could be that rural health boards including the Western Isles were more likely to have implemented Pharmacy First later, and as a result, fewer patients in lower socioeconomic areas (who are more likely to live in rural areas) have access to community pharmacists who are offering UTI screening and treatment services through Pharmacy First. Given more time as rural areas continue to further implement Pharmacy First, the differences in Pharmacy First utilization by socioeconomic status may decrease. Although, some rural areas lack pharmacies and instead have a general practitioner who provides both prescribing and dispensing services. Therefore, patients in these rural areas do not have access to a pharmacy in order to receive services through Pharmacy First.

Another possible factor contributing to differences in Pharmacy First utilization based on socioeconomic status could be that women in the lower socioeconomic status quintiles are more likely to meet exclusion criteria. Exclusion criteria such as having diabetes (which is more prevalent among underserved populations) may result in fewer women in lower socioeconomic status groups even being able to qualify for Pharmacy First. For some patients, this may result in delays to care, especially if these women feel they cannot afford to miss work, and unfortunately, these patients with diabetes will likely receive the same care through their general practitioners as they would through Pharmacy First. Grampian's health board has already decided to remove diabetes as an exclusion criterion, but many rural health boards continue to use diabetes to exclude those patients.[6] Therefore, it is important to critically think about the disparities in access to care for underserved populations caused by specific inclusion and exclusion criteria for Pharmacy First programs. In the future, policy makers and practitioners should ensure that inclusion and exclusion

criteria are not overly restrictive (particularly for the underserved) and carefully weigh the benefit versus risk of those criteria to patients.

Data from this program indicate that pharmacy services for the management of acute conditions such as UTIs are acceptable by a significant and growing portion of the population in Scotland, and these results may promote the further expansion of Pharmacy First to other conditions. Additionally, these results may be encouraging as other countries (including the United States) continue to pilot and implement similar programs. In the United States, chain and independent pharmacies alike are seeing the implementation of similar services including substance use programs and influenza screening in some pharmacies. Considering it took Scotland less than ten years to pilot UTI treatment programs in community pharmacies to see a nearly 20% nationwide utilization of pharmacies for UTI treatments, it may be reasonable to believe the United Kingdom as a whole as well as other countries could see the practice of pharmacy shift over the next ten years as more pharmacies implement similar services. These changes could play an essential public health role by improving access to care for patients and alleviating some of the burden of medical provider shortages through community pharmacists.

**Limitations and Future Directions**

One limitation of this data is a lack of clinical outcomes. Although this data provided a better understanding of how many people are using Pharmacy First compared to those continuing to see their general practitioner, it will be important to know whether or not these patients were successfully treated by following these patients after they receive their prescriptions. Additionally, it will also be important to estimate the cost or savings to the health system by implementing Pharmacy First. Therefore, research is needed to estimate costs in resources and time of pharmacy staff to offer UTI screening and to compare them to those of primary care or urgent care services

that these patients may be using instead. Before expanding the scope of Pharmacy First to other common conditions, it would also be beneficial and important to understand from a patient perspective how people felt after using Pharmacy First, whether it is a service they would recommend or use again, and why people who did not use Pharmacy First chose to receive care elsewhere. By conducting this research on patient satisfaction, it may also give insights into why patients may choose to receive care elsewhere. Finally, while exclusion and inclusion criteria such as age could be applied to the data in the Prescribing Information System to filter out prescriptions for patients who may not qualify for Pharmacy First, other criteria such as renal impairment could not. Therefore, this data may be overestimating the number of prescriptions potentially eligible for Pharmacy First that were prescribed by general practitioners leading to an underestimate in the percentage of potentially eligible prescriptions dispensed through Pharmacy First.

## CONCLUSION

Overall, these results demonstrate the successful implementation of a community pharmacy program for the treatment of UTIs across Scotland. These results also indicate further growth of the program over the coming months and years. Moreover, these results may support the expansion of Pharmacy First to other services and to areas outside of Scotland. Further research will be needed to determine what extent exclusion criteria, patient perceptions, and other factors play in determining the cause for disparities. Additionally, more information is needed to determine the cost versus savings to the health system with regards to community pharmacists providing these types of service.

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